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## The Cave Myriapods of the Ryukyu Islands (II)<sup>1)</sup>

By

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(Communicated by Yoshinori IMAIZUMI)

### CHILOPODA

#### *Prolamnonyx holstii* (POCOCK)

[Japanese name: Tsume-Jimukade]

*Geophilus* (?) *Holstii* POCOCK, 1895, Ann. Mag. nat. Hist., (VI), 15, p. 352, pl. 11, figs. 1, 1a.

*Prolamnonyx holstii*: SILVESTRI, 1919, Rec. Ind. Mus., 16, p. 85, fig. 25. — ATTEMS, 1929, in SCHULZE *et al.*, Tierreich, (52), p. 155, fig. 165. — TAKAKUWA, 1934, Bot. & Zool., Tokyo, 2, pp. 707, 721, figs. 21, 22; 1940, Fauna Nipponica, Tokyo, 9 (8-1), pp. 91, 92, figs. 95-96.

*Specimen examined.* 1 ♂, Uganju-gama Cave, 10 December 1972, coll. by S. UEJYO.

*Notes.* General characters of the present example agree well with the description given by TAKAKUWA (1940), though somewhat small (approximately 35 mm in body length). It is widely distributed in the Far East, but has not hitherto been recorded from the Ryukyus.

*Distribution.* Japan, Korea, Taiwan and South Manchuria.

#### *Mecistocephalus takakuwai* VERHOEFF

[Japanese name: Taka Nagazu-Jimukade]

*Mecistocephalus* (*Mecistocephalus*) *takakuwai* VERHOEFF, 1934, Zool. Jahrb., Syst., 66 (1/2), p. 36, pl. 4, figs. 58-60. — TAKAKUWA, 1934, Bot. & Zool., Tokyo, 2, pp. 707, 710, figs. 1-2, 8-10; 1940, Fauna Nipponica, Tokyo, 9 (8-1), pp. 53, 62, figs. 1-11, 56.

*Specimen examined.* 1 ♂, Nishibûmabaru-dô Cave, 26 August 1971, coll. by M. SHIMOJANA.

Body approximately 42 mm in length, with 59 pair of legs. Color pale yellow; head and prehensorial segment chestnut. Specific characters agree with the descriptions given by VERHOEFF and TAKAKUWA.

*Notes.* Originally described by VERHOEFF in 1934 on 10 specimens taken by TAKAKUWA in the vicinities of Tokyo, this is a well known mecistocephalid centiped

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1) Contribution No. 152 from the Spelaeological Society of Japan.

in Japan, and has already been recorded from Is. Okinawa (cf. TAKAKUWA, 1939 b, p. 123).

*Distribution.* Japan and Taiwan.

***Scolioplanes maritimus japonicus* VERHOEFF**

[Japanese name: Yamato Sukori-Jimukade]

*Scolioplanes maritimus japonicus* VERHOEFF, 1935, Zool. Anz., 111, p. 12. — TAKAKUWA, 1938, Zool. Mag., Tokyo, 50, pp. 236, 242, figs. 6-9; 1940, Fauna Nipponica, Tokyo, 9 (8-1), pp. 122, 125, figs. 130 B, 135-138.

*Specimen examined.* 1 ♀, Mee-gaa Cave, 30 August 1971, coll. by M. SHIMOJANA.

*Distribution.* Japan and Korea.

***Thalthybius tenuicollis* TAKAKUWA**

[Japanese name: Sakibuto-Jimukade]

*Thalthybius tenuicollis* TAKAKUWA, 1934, Zool. Mag., Tokyo, 46, p. 388, figs. 11-13.

*Thalthybius tenuicollis* TAKAKUWA, 1934, Trans. Sapporo nat. Hist. Soc., 13, p. 398, figs. 1-2; 1940, Fauna Nipponica, Tokyo, 9 (8-1), p. 43, figs. 41-44.

*Specimen examined.* One immature specimen, Taamoto-iizaa Cave, 28 October 1972, coll. by M. SHIMOJANA.

*Notes.* Though not fully mature, the specimen examined agrees with the description given by TAKAKUWA. This species has already been recorded from Is. Okinawa (TAKAKUWA, 1939 b, p. 123) and from Is. Uotsuri-jima in the Senkaku Islands (IKEHARA & SHIMOJANA, 1971, p. 110).

TAKAKUWA described this species twice in different journals and under different spellings of the scientific name. The older description (1934 b, p. 388; Sept. 15) was given under the correct name '*tenuicollis*', but the later one (1934 c, p. 398; Dec. 20) was headed by the name '*tenuicolis*'. In his list of Ryukyuan chilopods (1939 b, p. 123), TAKAKUWA adopted the correct spelling, but in his monograph of Japanese Geophilomorpha (1940, p. 43), he employed '*tenuicolis*' again. Such a negligence is commonly found in this author's writings. Needless to say, '*tenuicollis*' is the only valid name for the centiped.

***Bothropolys* sp.**

*Specimen examined.* 1 immature male, Mayaa-abu Cave, 22 February 1971, coll. by M. SHIMOJANA.

Only a single immature male was obtained. It cannot be determined because of its agenital state.

*Lithobius trichopus* TAKAKUWA

[Japanese name: Kéashi Ishimukade]

(Fig. 14)

*Lithobius trichopus* TAKAKUWA, 1939, Trans. Sapporo nat. Hist. Soc., 16, pp. 28, 30, pl. 1, fig. 1; 1942, Fauna Nipponica, Tokyo, 9 (8-3), pp. 47, 49, figs. 43, 44.

*Specimen examined.* 1 ♂, Yangaa-dô Cave, 25 October 1972, coll. by M. SHIMAJANA.

Body length 15 mm. Color dark brown in alcohol. Antennae long and slender, with 38-39 articles; all articles longer than wide. Cephalic plate almost as long as wide (W=1.5 mm, L=1.6 mm), sparsely setose at the frontal and lateral sides; eyes black, each consisting of 9 or 8 ocelli, which are ranged in 3 or 4 rows; Tömösvery organ very small. Prosternum sparsely setose at the anterior part. Prosternal teeth rather blunt and robust, 2+2, the median sinus U-shaped and rather shallow; porodont distinct. Tergites very sparsely clothed with short straight setae; posterior angles of 9, 11 and 13 produced, those of 9 relatively weak. All tarsi of legs 1-13 distinctly divided, each pretarsus with unequal accessory claws. Legs 14-15 long, their femur and tibia somewhat swollen and inner surface microscopically porous.

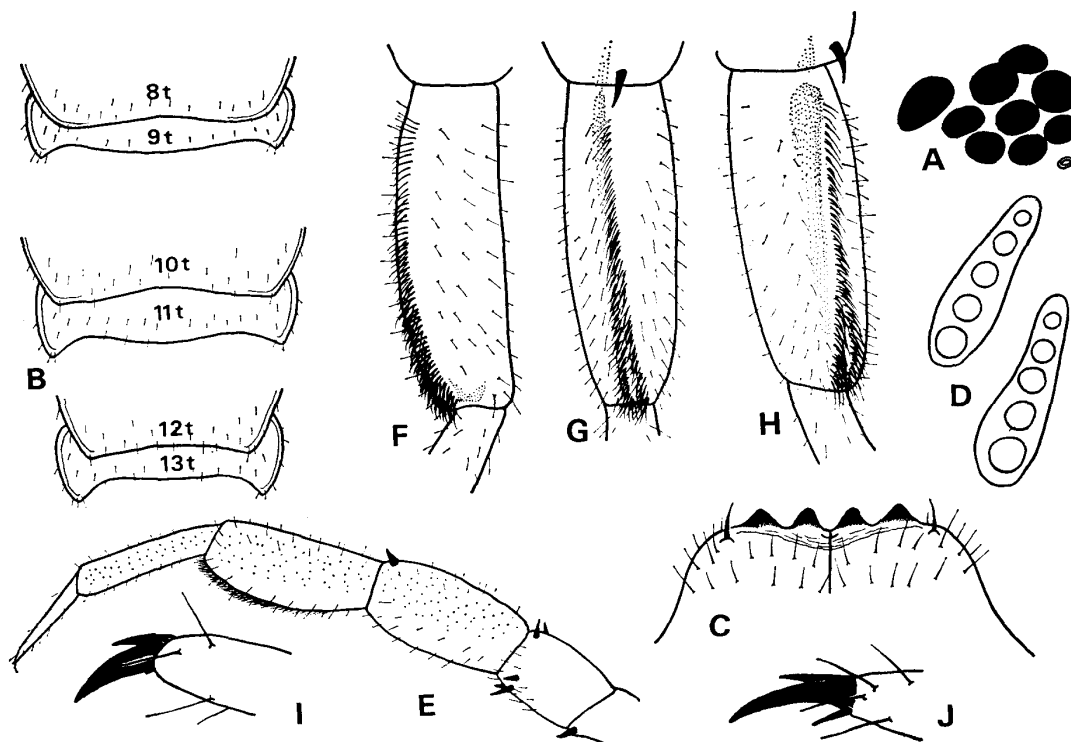


Fig. 14. *Lithobius trichopus* TAKAKUWA, a male of Yangaa-dô Cave. — A, Right eyes. B, Posterior corners of segments 8-13, dorsal aspects. C, Ventral aspect of anterior border of prosternum, showing teeth. D, Coxal pores on right legs 13 and 14. E, Left leg 15, inner aspect. F-H, Femur of leg 15, lateral, ventral and ventro-lateral aspects. I, J, Tarsal claw of leg 15.

Male sexual modification is found on anal legs; tibia at its ventral side with a longitudinal row of peculiar bristles as shown in Fig. 14 E–H, the bristles becoming denser and arranged into two rows at distal half. Plectrotaxy of a male specimen is summarized in Table 1. Coxal pores present on legs 12–15, uniform, arranged 4, 5, 4, 4 on the left, and 4, 5, 5, 4 on the right.

Table 1. Plectrotaxy of *Lithobius trichopus*; in a male specimen from Yangaa-dô Cave.

	Dorsal				Ventral			
	C	P	F	Ti	Tr	P	F	Ti
1		p	a	a			am	m
2		p	ap	a		mp	amp	am
3		p	ap	a		mp	amp	am
4		p	ap	ap		mp	amp	am
5		p	ap	ap		mp	amp	am
6		ap	ap	ap		mp	amp	am
7		ap	ap	ap		mp	amp	am
8		ap	ap	ap		mp	amp	am
9		ap	ap	ap		mp	amp	am
10		ap	ap	ap		mp	amp	am
11		amp	ap	ap		mp	amp	am
12		amp	ap	ap		mp	amp	am
13		amp	ap	ap	m	amp	amp	am
14		amp	p	p	m	amp	amp	am
15	a	amp	p		m	amp	am	

C=coxa, P=prefemur, F=femur, Ti=tibia, Tr=trochanter; a=anterior spur, m=medial, p=posterior.

Female unknown.

*Notes.* Originally described from Chunan (Tikunan in Japanese) in Taiwan, this species is characterized by the sexual modification in male. TAKAKUWA stated that "Tibia des 15. Beins ♂ ventral mit einer dichten Borstenreihe," and gave a sketch of an anal leg. These are not sufficient for a description of the new species, but fit well in the present example. Although some differences are observed between the specimen and TAKAKUWA's original account in the number of ocelli and articles of antennae as well as in the spinulation on selected legs, the author regards it as conspecific with the Taiwanese centiped. In Taiwan, two additional localities of this species were recorded by WANG (1959).

### *Thereuopoda* sp.

(Figs. 15 and 16)

*Specimens examined.* 1 larva, Mumei-no-gama Cave, 31 July 1972, coll. by M. SHIMOJANA; 1 larva, Nobaru-gama Cave, 9 September 1972, coll. by M. SHIMOJANA.

*Notes.* Several somatic characters of two larval specimens examined are given below:

1) Larva of the 1st stadium (from Nobaru-gama Cave):— Body small and spindle-shaped, approximately 4.2 mm, with four leg-pairs. Color violescent brown; antennae and legs orange; eyes black. Antennae long, approximately 5.5 mm, distinguishable into three divisions; flagellum primum composed of 11 articles, each of which bears disto-marginal hairs; flagellum secundum composed of about 30 articles. Three large tergites present, each of them bearing embryonal hairs (yellowish orange), and no stoma. Spination and articulation of legs embryonic. Embryonic somite with four leg-buds, four sternites and tergites.

2) Larva of the 5th stadium (from Mumei-no-gama Cave):— Body approximately 7.2 mm, with 11 leg-pairs. Color violescent brown; legs grayish white, though its tarsal portion is pale yellowish brown. Antennae approximately 25 mm, distinguishable into four divisions; flagellum primum composed of 27–28 articles, the secundum of 49–55 articles. Six large tergites present; each of tergites 1 through 4

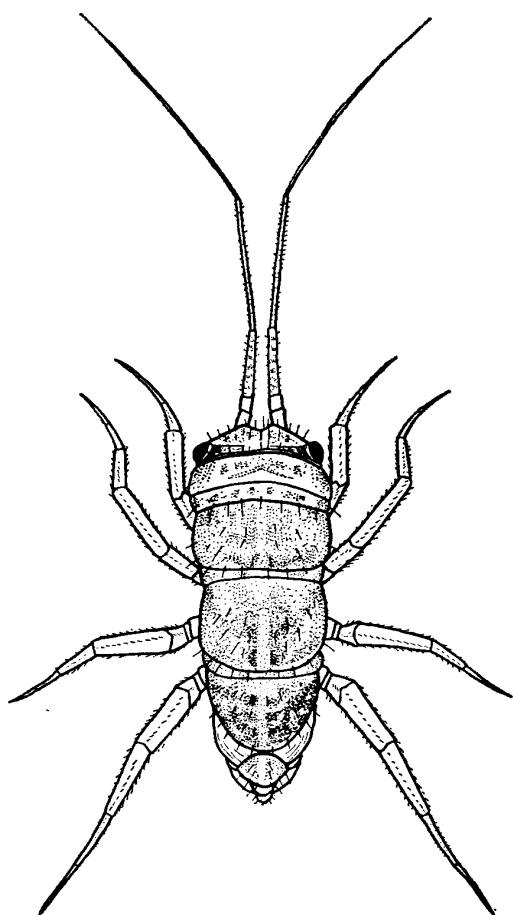


Fig. 15. The youngest larva of *Thereuopoda* sp., of Nobaru-gama Cave.

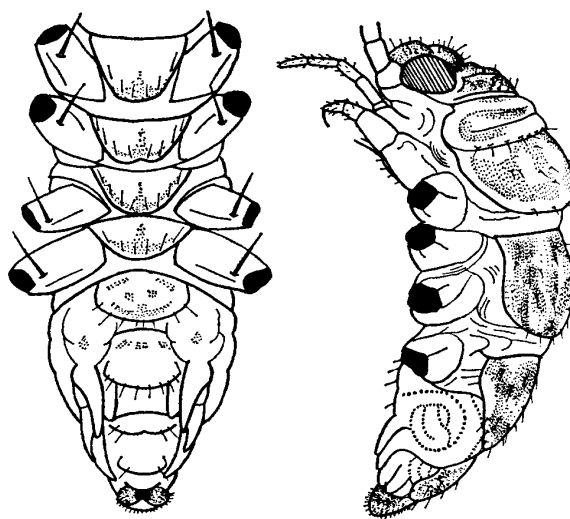


Fig. 16. Body form of the youngest larva of *Thereuopoda* sp., ventral (left) and lateral (right) aspects.

with small stoma. Spination and articulation of legs immature; 1/1, 1/0, 0/1 with 7+28 tarsal articles in leg 1; 1/1, 1/1, 1/1 with 6+23 tarsal articles in leg 10. Embryonic somite of the same structure as that of the first larva.

### Zoogeographic Notes

It is well known that the Ryukyu island chain forms a transitional area between the Palearctic and Oriental Regions. A number of papers have been published on this subject, and the Tokara Straits are usually regarded as the greatest gap between the northern and southern faunas. However, only a very little has hitherto been known on the cave myriapod fauna of the archipelago.

Thanks to the efforts of Dr. UÉNO and his collaborators, we have now gained a fairly good knowledge of the fauna. Most of the important caves have been explored and investigated, and seventeen different species of myriapods have been found there. If we include in the list the previous records by VERHOEFF, TAKAKUWA, MIYOSI and MURAKAMI, the total number of myriapods hitherto found in the Ryukyuan caves attains to twenty. Of these, the centipeds, eight in number, are not so important from the biospeological point of view, since they do not contain highly specialized forms. Therefore, only the millipeds will be taken up for the following discussion.

As is summarized in Table 2, twelve species and a subspecies of millipeds have been obtained from Ryukyuan caves up to now. Troglobiontic forms are found in

Table 2. Distribution of cave millipeds in the Ryukyu Islands.

	Is. Toku-no-shima	Is. Okinoérabu-jima	Is. Yoron-tô	Is. Okinawa	Is. Kumé-jima	Is. Miyako-jima	Is. Ishigaki-jima	Is. Yonaguni-jima
<i>Monographis</i> sp.				+				
<i>Hyleoglomeris yamashinai</i>				+				
<i>Glyphiulus septentrionalis</i> *				+				
<i>Dolichoglyphius asper</i> *				+				
<i>D. asper brevipes</i> *					+			
<i>Anaulaciulus</i> sp.				+				
<i>Oxidus gracilis</i>		+		+	+	+	+	
<i>Riukiupeltis uenoi</i>							+	
<i>Niponia</i> sp.				+	+		+	
<i>Corypholophus ryukyuensis</i> *	+	+	+	+		+	+	+
<i>Kylindogaster nodulosa</i>							+	
<i>Epanerchodus subterraneus</i> *				+				
<i>Polydesmus tanakai</i>		+						

\* Troglobiontic species.

the four genera, *Glyphiulus*, *Dolichoglyphius*, *Corypholophus* and *Epanerchodus*, of which the former three are not represented in the mainland of Japan.

The genera *Glyphiulus* and *Dolichoglyphius* belong to the family Cambalidae, which is decisively Indo-Malayan. *Glyphiulus* is predominant in tropical Asia and extends northwards to Is. Okinawa through the southern part of China and Taiwan, but not to the Philippines. The Okinawan species seems closely related to the Taiwanese, but members of this genus have not been found in the caves of the Miyako and Yaeyama island groups that lie between the distributional ranges of the two species. This may indicate that the origin of Okinawan *G. septentrionalis* is considerably old. It may have been isolated there ever since the central Ryukyus were cut off from the Asian Continent and the mainland of Japan.

More remarkable is the case of the monotypic genus *Dolichoglyphius*. This genus is endemic to three islands of the Okinawa group, and forms its own subfamily in the family Cambalidae. Since its direct relatives have not been known from any other parts of Asia, it can be safely regarded as a relict of an old fauna, having long been preserved in the old islands of the central Ryukyus. That *D. asper* becomes differentiated into two geographical races between the Islands of Okinawa (with its accessory islet Hamahiga-jima) and Kumé-jima also suggests the antiquity of the group. Incidentally, both *Glyphiulus* and *Dolichoglyphius* are guanobiontic to a considerable extent (according to Dr. UENO, pers. comm.), and are comparable to *Skleroprotopus* of the Japanese mainland.

As compared with the cambalids, *Corypholophus* is rather poorly known. Until the present discovery was made, the genus had been recorded only from Viet-Nam. However, such a seemingly discontinuous distribution as this should be attributed to the inadequacy of investigations in the intervening areas. This is readily surmised from the fact that *C. ryukyuensis* is the cave-dwelling species most widely distributed in the Ryukyu Islands and cannot be regarded as an old element. It occurs even in such young islands as Okinoérabu-jima, Yoron-tô and Yonaguni-jima, and may also be found in dark wet places outside of caves. Anyway, the genus is doubtless of the southern origin and seems to have invaded the Ryukyus through southern China and Taiwan.

Contrary to the above three, the *Epanerchodus* of the Okinawan caves has its close relatives only in the mainland of Japan and in the Island of Cheju-do off South Korea. Although the 'genus' comprises a number of species, both epigean and cavernicolous, widely spread over the Japanese Islands and their adjacent areas, small troglobiontic members belonging to the species-group currently called *Antrochodus* or *Riuerchodus* are distributed only along the Pacific side of southern Japan, from the western part of Kôchi Prefecture in Shikoku in the west to the southern part of the Kwantô Mountainins in the east, with isolated ranges in the Islands of Cheju-do and Okinawa. No representatives of the species-group have been known in Kyushu, where the caves are occupied by the members of *Prionomatis*. The Okinawan *subterraneus* is morphologically closer to the species occurring in the lava caves of Cheju-

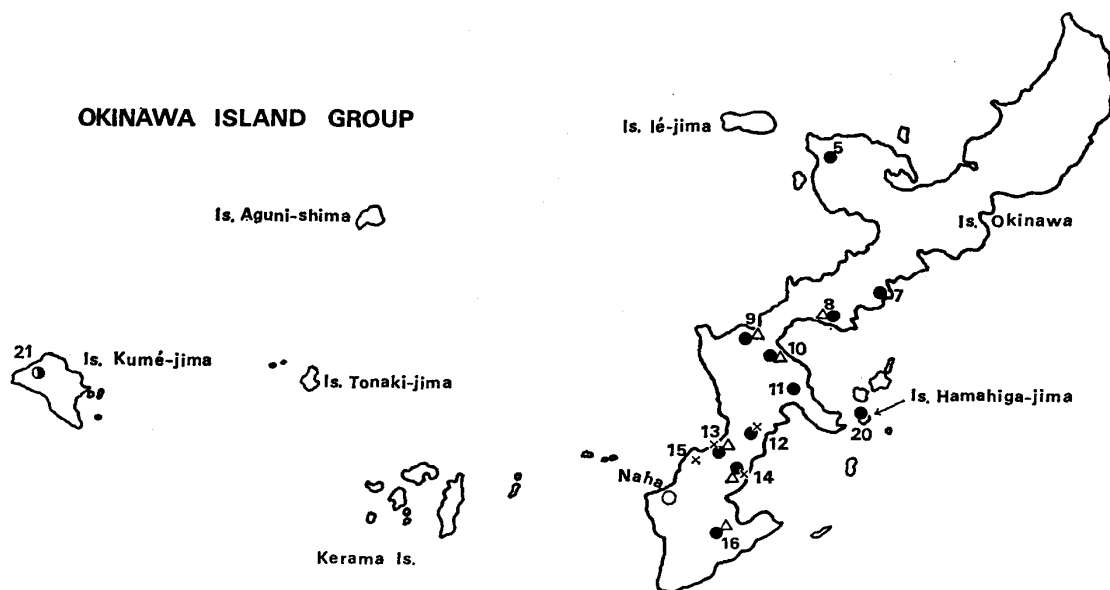


Fig. 17. Map showing the known localities of troglobiontic millipeds in the Okinawa group of the central Ryukyus. — *Dolichoglyphius asper asper*, solid circles; *D. asper brevipes*, semi-solid circle; *Glyphiulus septentrionalis*, crosses; *Epanerchodus subterraneus*, open triangles. — 5, Nobaru-gama Cave; 7, Mee-gaa Cave; 8, Nisshû-dô Cave; 9, Kabuyaa-gama Cave; 10, Tera-no-gama Cave; 11, Mayaa-gama Cave; 12, Zukeran-dô Cave; 13, Futenma-dô Cave; 14, Taabaru-gama Cave; 15, Mayaa-abu Cave; 16, Amachijô-gama Cave; 20, Ôabu-gama Cave; 21, Yajaa-gama Cave.

do than to those of the Japanese mainland (cf. MURAKAMI and PAIK, 1968, pp. 372–375). This phenomenon may suggest that the northerly ocean current along the western coast of Kyushu has played an important role in the formation of the existing pattern of their distribution. From such a view, however, it is difficult to elucidate why the species-group does not occur in Kyushu. Perhaps the Okinawan species is a relict of an ancient fauna, which existed along the ancient Pacific coast of East Asia when the central Ryukyus were still united by land with Japan.

In short, the cave milliped fauna of the Ryukyu Islands is mainly characterized by two features: 1) predominance of the Oriental elements, and 2) occurrence of peculiar endemic species in the islands of the Okinawa group. Because of the first feature, this fauna as a whole is considerably different from that of the Japanese mainland, though it contains a species that bears a close relationship to the latter. Unfortunately, troglobiontic forms are so poorly known in the islands of the Amami group, that we cannot decide at present which part of the archipelago forms a boundary between the northern and southern faunas.

The second feature is apparent, since three out of the four troglobiontic species endemic to the Ryukyus are found only in the islands of the Okinawa group. Only the exception is *Corypholophus ryukyuensis*, which appears to be a recent cavernicole and is not comparable with the others. Naturally, there are minor differences in dis-



tribution between the three species endemic to the central Ryukyus (cf. Fig. 17); *Glyphiulus septentrionalis* and *Epanerchodus subterraneus* occur only in Is. Okinawa and the former is more restricted in distribution than the latter, while *Dolychoglyphius asper* is found in the three islands, Okinawa, Hamahiga-jima and Kumé-jima. However, all these species can be regarded as relicts of an old fauna, and probably as a proof that the central part of the Ryukyus has long been isolated from the adjacent land masses.

### References

- ATTEMS, C., 1909. Die Myriopoden der Vega-Expedition. *Ark. Zool.*, **5** (3): 1-84, pls. 1-5.
- 1928. The Myriopoda of South Africa. *Ann. S. Afr. Mus.*, **26**: i-vii+1-431, 26 pls.
- 1929. Myriapoda 1. Geophilomorpha. In SCHULZE *et al.*, *Das Tierreich*, (52): I-XXIII+1-388. Berlin and Leipzig, Walter de Gruyter.
- 1938. Die von Dr. C. DAWYDOFF in französisch Indochina gesammelten Myriopoden. *Mém. Mus. Hist. nat., Paris*, (n.s.), **6**: 187-353.
- 1940. Myriapoda 3. Polydesmoidea III. Fam. Polydesmidae, Vanhoeffenidae, Cryptodesmidae, Oniscodesmidae, Sphaerotrichopidae, Peridontodesmidae, Rhachidesmidae, Macellophoridae, Pandirodesmidae. In SCHULZE *et al.*, *Das Tierreich*, (70): I-XXXII+1-577. Berlin and Leipzig, Walter de Gruyter.
- 1953. Myriopoden von Indochina. Expedition von Dr. C. DAWYDOFF (1938-1939). *Mém. Mus. Hist. nat., Paris*, (A), **5**: 133-230.
- CHAMBERLIN, R. V., & Y. M. WANG, 1953. Records of millipeds (Diplopoda) from Japan and other Oriental areas, with descriptions of new genera and species. *Amer. Mus. Novit.*, (1621): 1-13.
- & R. L. HOFFMAN, 1958. Checklist of the millipeds of North America. *U. S. Natn. Mus. Bull.*, (212): I-III+1-236.
- HOFFMAN, R. L., 1958. Appalachian Cambalidae: Taxonomy and distribution (Diplopoda: Spirostreptida). *J. Wash. Ac. Sci.*, **48**: 90-94.
- IKEHARA, S., & M. SHIMOJANA, 1971. The terrestrial animals of Senkaku Islands. *Report of the Scientific Expedition to Senkaku Islands 1971 (July)*: 85-140. Naha. (In Japanese, with English résumé.)
- JECKEL, C. A. W., 1956. Milliped miscellany—Part III. *Beaufortia*, **5**: 73-99.
- 1968. On the classification and geographical distribution of the family Paradoxosomatidae (Diplopoda, Polydesmida). 1-162 pp. Amsterdam, Nederlandse Entomologische Vereniging.
- 1970. Nomenclator generum et familiarum Diplopodrum: A List of the genus and family-group names in the class Diplopoda from the 10th edition of LINNAEUS, 1758, to the end of 1957. *Monogr. Nederl. ent. Vereniging, Amsterdam*, **5**: I-XII+1-412.
- LOKSA, J., 1960. Einige neue Diplopoden- und Chilopoden-Arten aus chinesischen Höhlen. *Acta Zool. Ac. Sci. Hung., Budapest*, **6**: 135-148.
- MAURIES, P. J-P., 1970. Examen des types des genres *Cambalomorpha* et *Cambalopsis* POCKOCK, 1895. Essai de classification des Glyphiulinae VERHOEFF, 1936 (Diplopoda, Cambalidea). *Bull. Mus. Hist. nat., Paris*, (2), **42**: 509-519.
- MIYOSI, Y., 1955 a. Beiträge zur Kenntnis japanischer Myriopoden. 14. Aufsatz: Über eine neue Art von Lithobiomorpha und zwei neue Arten von Diplopoda. *Zool. Mag., Tokyo*, **64**: 267-270. (In Japanese, with German résumé.)
- 1955 b. The Tokara Group as seen by a myriapodologist. *Collecting and Breeding, Tokyo*, **17**: 335-336, 338. (In Japanese.)

- MIYOSI, Y., 1957. Beiträge zur Kenntnis japanischer Myriopoden. 20. Aufsatz. Über eine neue Gattung von Diplopoda, eine neue Art und eine neue Unterart von Chilopoda. *Zool. Mag., Tokyo*, **66**: 264–268. (In Japanese, with German résumé.)
- 1959. Über japanischer Diplopoden. i–iii+1–223 pp., with 3 folders & 19 pls. Osaka, Arachnological Society of East Asia. (In Japanese.)
- MURAKAMI, Y., 1970. Two new cave-dwelling millipeds from Japan. *Annot. zool. Japon.*, **43**: 105–111.
- & K. Y. PAIK, 1968. Results of the Speleological Survey in South Korea 1966. XI. Cave-dwelling myriapods from the southern part of Korea. *Bull. Natn. Sci. Mus., Tokyo*, **11**: 363–384.
- OMINE, T., 1965. Diplopods from the Ryukyus, and their distribution. *Mem. Okinawa Univ., Naha*, **8**: 1–15, with 1 folder. (In Japanese.)
- POCOCK, R. I., 1895. Report upon the Chilopoda and Diplopoda obtained by P. W. BASSETT-SMITH, Esq., Surgeon R. N., and J. J. WALKER, Esq., R. N., during the cruise in the Chinese Seas of H. M. S. 'Penguin', Commander W. U. MOORE commanding. *Ann. Mag. nat. Hist.*, (VI), **15**: 346–372, pl. XI.
- SHIMOJANA, M., 1973. Results of the speleological survey in Yaeyama Islands. *Okinawa Ass. biol. Educ., Naha, Okinawa*, **8**: 1–26. (In Japanese.)
- SILVESTRI, F., 1919. Contribution to a knowledge of the Chilopoda Geophilomorpha of India. *Rec. Ind. Mus., Calcutta*, **18**: 45–107.
- 1923. Descriptions of some Indian and Malayan Myriapoda Cambaloidea. *Ibid.*, **25**: 181–193.
- TAKAKUWA, Y., 1934 a. Mecistocephalid centipeds of Japan. [I], [II]. *Bot. & Zool., Tokyo*, **2**: 706–712, 878–884. (In Japanese.)
- 1934 b. Centipeds of Japan. *Zool. Mag., Tokyo*, **46**: 383–390. (In Japanese.)
- 1934 c. Sechs neue Arten der Chilopoden aus Japan. *Trans. Sapporo nat. Hist. Soc.*, **13**: 398–406.
- 1938. Über die japanischen *Scolioplanes* (Chilopoda)-Arten. *Zool. Mag., Tokyo*, **50**: 235–245. (In Japanese, with German résumé.)
- 1939 a. Über japanische *Lithobius*-Arten. (7 bekannte und 12 neue Arten). *Trans. Sapporo nat. Hist. Soc.*, **18**: 28–37, pl. 1.
- 1939 b. Chilopoden aus Ryukyu Inseln. *Trans. biogeogr. Soc. Japan*, **3**: 123–126. (In Japanese, partly with German descriptions.)
- 1940. Geophilomorpha (Class Chilopoda — Epimorpha). In OKADA *et al.*, *Fauna Nipponica*, **9** (8–1): 1+1–7+1–156. Tokyo, Sanseido. (In Japanese.)
- 1942. Lithobiomorpha (Class Chilopoda — Anamorpha). *Ibid.*, **9** (8–3) (for 1941): 1+1–2+1–104. (In Japanese.)
- 1954. Diplopoden aus Japan und ihn angrenzenden Gebieten. 1–6+1–4+1–241+1–10 pp. Tokyo, Japan Society for the Promotion of Science. (In Japanese, partly with German résumé.)
- TAKASHIMA, H., & A. HAGA, 1956. A contribution towards the Japanese cave-dwelling species of the class Diplopoda. *Misc. Rep. Yamashina's Inst. Orn. & Zool., Tokyo*, **1**: 329–343, pls. 1–2. (In Japanese.)
- VERHOEFF, K. W., 1931. Chilognathen aus den Bergamasker Alpen und Nachbargebieten; auch über zwei neue Gattungen der Polydesmoidea aus Spanien und Japan. *Zool. Jahrb., Syst.*, **61**: 397–452, pls. 6–8.
- 1934. Beiträge zur Systematik und Geographie der Chilopoden. *Ibid.*, **66**: 1–112, pls. 1–6.
- 1935. Über *Scolioplanes* (Chilopoda). *Zool. Anz.*, **111**: 10–23.
- 1936 a. Zur Kenntnis der Glyphiuliden (Cambaloidea). 143. Diplopoden-Aufsatz. *Ibid.*, **113**: 49–62.
- 1936 b. Ueber Diplopoden aus Japan, gesammelt von Herrn Y. TAKAKUWA. *Trans. Sapporo*

- nat. Hist. Soc.*, **14**: 148–172, pls. 3–4.
- VERHOEFF, K. W., 1937. Zur Kenntnis ostasiatischer Diplopoden II. *Zool. Anz.*, **119**: 33–40.
- 1938. Ostasiatische Höhlendiplopoden (148. Diplopoden-Aufsatz.). *Mitt. Höhlen- u. Karstforsch.*, **1938**: 83–93.
- 1939 a. Zur Kenntnis ostasiatischer Diplopoden. III. *Zool. Anz.*, **127**: 113–125.
- 1939 b. Zur Kenntnis ostasiatischer Diplopoden IV. *Ibid.*, **127**: 273–285.
- 1939 c. Diplopoden von der Ryukyu-Insel Okinawa. *Trans. biogeogr. Soc. Japan*, **3**: 118–122.
- 1940. Das unbekannte ♂ von *Dolichoglyphius asper* VERH. aus Riu-Kiu-Höhle. *Mitt. Höhlen- u. Karstforsch.*, **1940**: 20–24.
- 1942. AscospERMophoren aus Japan und über neue japanische Diplopoden. *Zool. Anz.*, **137**: 201–217.
- WANG, Y. M., 1957. Records of myriapods on Taiwan Islands (3)—Pescadore Islets, Kao-Yung, Pingtung, Changhua and Taipei. *Quart. J. Taiwan Mus.*, **10**: 23–29.
- 1959. On Chilopoda from Taiwan with a new lithobiid. *Ibid.*, **12**: 195–199.